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[Title of the Invention] Intermediate Device, Intermediate Device Control Program & Program Recorded Medium thereof, Intermediate Device Control Method, and Image Forming Apparatus Remote Management System
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Control Program & Program Recorded Medium thereof, Intermediate Device Control Method, and Image Forming Apparatus Remote Management System

[Scope of Claims]

[Claim 1]

An intermediate device connected with a server device, characterized by:

transmitting, to the server device, data describing a client side request corresponding to a newly generated request of an intermediate device side and a response to a server device side request corresponding to a request to the intermediate device; and

receiving, from the server device, data describing a response to the client side request and a newly generated server device side request at the server device.

[Claim 2]

The intermediate device according to claim 1, characterized by executing the server device side request and transmitting a response to the server device side request being output as a result of the execution.

[Claim 3]

An intermediate device connected with a server device, comprising:

a storing means including a first memory area for storing a server device side request corresponding to a request to the intermediate device and a response from the intermediate device to the request in association with each other, and a second memory area for storing a client side request corresponding to a request from the intermediate device;

a request generation means for generating the client side request and storing the request to the second memory area of the storing means;

a response generation means for reading a server device side request from the first memory area of the storing means, generating a response to the request, and storing to the first memory area;

a request output means for transferring a request including a response to the read server device side request and the client side request to the server device connected by the intermediate device via a communication network;

a response acquisition means for acquiring a response including the server device request and a response to the client side request from the connected server device; and

a response distribution means for storing the server device request included in the acquired response to the first memory area of the storing means and specifying the client side request of the second memory area corresponding to a response to the client side request contained in the response.

[Claim 4]

An intermediate device connected with a server device, comprising:

a storing means including a first memory area for storing a server device side request corresponding to a request to the intermediate device, a response from the intermediate device to the request, and the request identification information of the request in association with each other, and a second memory area for storing a client request corresponding to a request from the intermediate device and the request identification information of the request in association with each other;

a request generation means for generating the client side request, assigning the request identification information for identifying the request, and storing in the second storing area of the storing means;

a response generation means for reading a server device side request from the first storing area of the storing means,

generating a response to the request, and storing the response and the request identification information of the server device side request in association with each other in the first storing area;

a request collection means for reading the association of the response generated by the response generation means and the request identification information of the server device side request corresponding to the response from the first storing area, and reading the association of the client side request generated by the request generation means and the request identification information of the request from the second storing area;

a request output means for transferring a request including the association of a response to the read server device side request and the request identification information of the request and the association of a client request and the request identification information of the request, to the server device connected by the intermediate device through a communication network;

a response acquisition means for acquiring, from the connected server device, a response including the association of the server device side request and the request identification information of the request and the association of a response to the client side request and the request identification information of the request; and

a response distribution means for storing the association, included in the acquired response, of the server device side request and the request identification information of the request, in the first storing area of the storing means, checking the request identification information associated with the response to the client side request included in the response and the request identification information of the request assigned to each client side request in the second storing area, and specifying the client side request in the second storing area, corresponding to the response to the client side request.

[Claim 5]

The intermediate device according to claim 4, characterized in that the request collection means periodically reads from the first storing area and the second storing area.

[Claim 6]

The intermediate device according to claim 4, characterized in that:

the request collection means serializes, in accordance with a code defined by a predetermined address, the read association of a response to a server device side request and the request identification information of the server device side request corresponding to the response, and the read association of a client side request and the request identification information;

the request output means contains in the request and transfers to the server device, the serialized association of a response to a server device side request and the request identification information of the server device side request corresponding to the response and the serialized association of a client side request and the request identification information;

the response acquisition means acquires the response including the association serialized in accordance with a code defined with a predetermined address, of the server device side request and the request identification information and the association serialized in accordance with a code defined with a predetermined address, of a response of the client side request and the request identification request; and

the response distribution means breaks down, in accordance with a code defined with a predetermined address, the association included in the acquired response, of the server device side request and the request identification information and the association included in the acquired response, of a response to the client side request and the request identification information.

[Claim 7]

The intermediate device according to claim 6, characterized in that the request collection means serializes the request identification information of the read server device side request and the request identification information of the read client side request as a SOAP header and the response to the read server device side request and the client side request as a SOAP body.

[Claim 8]

The intermediate device according to claim 7, including an attachment processing means for setting a link between the serialized association of a response to a server device side request and the request identification information and the serialized association of a client side request and the request identification information and associating each other.

[Claim 9]

An intermediate device control program available to be installed on an intermediate device connected with a server device, for causing a processing means of the intermediate device to execute steps of:

Transmitting, to the server device, data describing a newly generated client side request corresponding to an intermediate device side request and a response to a server device side request corresponding to a request to the intermediate device; and

Receiving, from the server device, data describing a response to the client side request and a server device side request newly generated by the server device.

[Claim 10]

The intermediate device control program according to claim 9, for causing the processing means of the intermediate device to execute a step for executing the server device side request and transmitting the response to the server device side request, which is output as a result of the execution.

[Claim 11]

An intermediate device control program for causing a control means of an intermediate device connected with a server device to execute steps of:

securing a first storing area for storing a server device side request corresponding to a request to the intermediate device and a response to the request from the intermediate device in association with each other and a second storing area for storing a client side request corresponding to a request from the intermediate device, in a storing means provided in the intermediate device;

generating the client side request and storing the request in the second storing area of the storing means;

reading the server device side request from the first storing area of the storing means, generating a response to the request and storing the response in the first memory area;

reading the generated response, and reading the generated client side request from the second storing area;

transferring a request including the read response to the server device side request and the client side request to the server device connected by the intermediate device through a communication network;

acquiring, from the connected server device, a response including the server device side request and a response to the client side request; and

storing the server device side request included in the acquired response in the first storing area of the storing means, and specifying a client side request in the second storing area corresponding to the client side request included in the response.

[Claim 12]

An intermediate device control program for causing a control means of an intermediate device connected with a server device to execute steps of:

Securing, in a storing means provided by the intermediate device,

a first storing area for storing a server device side request corresponding to a request to the intermediate device and a response from the intermediate device to the request and the request identification information of the request in association with each other and a second storing area for storing a client side request corresponding to a request from the intermediate device and the request identification information of the request in association with each other;

generating the client side request, assigning the request identification information for identifying the request, and storing the request in the second storing area of the storing means;

reading the server device side request from the first storing area of the storing means, generating a response to the request, and storing the response in the first memory area in association with the request identification information of the server device side request;

reading the association of the generated response and the request identification information of a server device side request corresponding to the response from the first storing area, and the association of the generated client side request and the request identification information of the request from the second storing area;

transferring a request including the association of the read response to the server device side request and the request identification information of the request and the association of the client side request and the request identification information of the request, to the server device connected by the intermediate device through a communication network;

acquiring, from the connected server device, a response including the association of the server device side request and the request identification information of the request and the association of the response to the client side request and the

request identification information of the request; and

storing, in the first storing area of the storing means, the association which is included in the acquired response, of the server device side request and the request identification information of the request, checking the request identification information associated with a response to the client side request included in the response and the request identification information of the request, which is assigned to each client side request in the second storing area, and specifying a client side request in the second storing area, which corresponds to a response to the client side request.

[Claim 13]

The intermediate device control program according to claim 12, for causing the controlling means to execute a step for periodically reading from the first storing area and the second storing area.

[Claim 14]

The intermediate device control program according to claim 12, for causing the control means to execute steps of:

serializing, in accordance with a code defied with a predetermined address, the read association of a response to a server device side request and the request identification information of the server device side request corresponding to the response and the read association of a client side request and the request identification information;

including in the server device and transferring the serialized association of a response to a server device side request and the request identification information of the server device side request corresponding to the response and the serialized association of a client side request and the request identification information;

acquiring, from the server device, the response including the association of the server device side request and the request

identification information and the association of a response to the client side request and the request identification information, both association serialized in accordance with a code defined with a predetermined address;

breaking down, in accordance with a code defined with a predetermined address, the association of the server device side request and the request identification information and the association of the client side request and the request identification information, both association included in the acquired response.

[Claim 15]

The intermediate device control program according to claim 14, for causing the control means to execute a step for serializing request identification information of the read server device side request and request identification information of the client side request as a SOAP header, and serializing a response to the read server device side request and a client side request as a SOAP body.

[Claim 16]

The intermediate device control program according to claim 15, for causing the control means to execute a step for setting a link between the serialized association of a client side request and the request identification information and the serialized association of a response to a server device side request and the request identification information and associating each other.

[Claim 17]

A control method by a control means of an intermediate device connected with a server device, including procedures for:

transmitting, to the server device, data describing a client side request corresponding to a newly generated intermediate device side request and a response to a server device side request corresponding to a request to the intermediate device; and

receiving, from the server device, data describing a response

to the client side request and a newly generated server device side request at the server device.

[Claim 18]

The control method according to claim 17, including a procedure for executing the server device side request by the control means and transmitting a response to the server device side request, which is output as a result of the execution.

[Claim 19]

A control method by a control means of an intermediate device connected with a server device, including procedures for:

securing a first storing area for storing a server device side request corresponding to a request to the intermediate device and a response from the intermediate device to the request in association with each other and a second storing area for storing a client side request corresponding to a request from the intermediate device, in the storing means of the intermediate device;

generating and storing the client side request in the second storing area of the storing means;

reading a server device side request from the first storing area of the storing means, generating and storing a response to the request in the first memory area;

reading the generated response and reading the generated client side request from the second storing area;

transferring a request including the read response to the server device side request and the client side request to the server device connected by the intermediate device through a communication network;

acquiring a response including the server device side request and the response to the client side request from the connected server device; and

storing a server device side request included in the acquired response in the first storing area of the storing means, and

specifying a client side request in the second storing area corresponding to the client side request included in the response.

[Claim 20]

A control method by a control means of an intermediate device connected with a server device, including procedures for:

Securing, in a storing means of the intermediate device, a first storing area for storing a server device side request corresponding to a request to the intermediate device, a response from the intermediate device to the request, and the request identification information of the request in association with each other and a second storing area for storing a client side request corresponding to a request from the intermediate device and the request identification information of the request in association with each other;

generating the client side request, assigning the request identification information for identifying the request, and storing the request to the second storing area of the storing means;

reading the server device side request from the first storing area of the storing means, generating a response to the request and storing the response in association with the request identification information of the server device side request in the first memory area;

reading the association of the generated response with the request identification information of a server device side request corresponding to the response from the first storing area, and the association of the generated client side request with the request identification information of the request from the second storing area;

transferring a request including the association of the read response to the server device side request and the request identification information of the request and the association of the client side request and the request identification

information of the request, to the server device connected by the intermediate device through a communication network;

acquiring, from the connected server device, a response including the association of the server device side request and the request identification information of the request and the association of the response to the client side request and the request identification information of the request; and

storing, in the first storing area of the storing means, the association included in the acquired response of the server device side request and the request identification information of the request, checking the request identification information associated with a response to the client side request included in the response and the request identification information of the request assigned to each client side request in the second storing area, and specifying a client side request in the second storing area, which corresponds to a response to the client side request.

[Claim 21]

The control method according to claim 20, including a procedure for periodically reading from the first storing area and the second storing area by the control means.

[Claim 22]

The control method according to claim 20 by the control means, including procedures for:

serializing in accordance with a code defied with a predetermined address the read association of a response to a server device side request and the request identification information of the server device side request corresponding to the response and the read association of a client side request and the request identification information;

including in the request and transferring, to the server device, the serialized association of a response to a server device side request and the request identification information of the server device side request corresponding to the response and the

serialized association of a client side request and the request identification information;

acquiring the response, from the server device, including the association of the server device side request and the request identification information and the association of a response to the client side request and the request identification information, wherein both of the association are serialized in accordance with a code defined with a predetermined address;

breaking down, in accordance with a code defined with a predetermined address, the association of the server device side request and the request identification information and the association of the client side request and the request identification information, wherein both of the association are included in the acquired response.

[Claim 23]

The control method according to claim 22 by the control means, including a procedure for serializing the request identification information of the read server device side request and the request identification information of the client side request as a SOAP header and serializing a response to the read server device side request and a client side request as a SOAP body.

[Claim 24]

The control method according to claim 23 by the control means, including a procedure for setting a link between the serialized association of a client side request and the request identification information is connected with the serialized association of a response to a server device side request and the request identification information and associating each other.

[Claim 25]

A computer readable storing medium, on which the control programs according to claims 9 to 16 are stored.

[Claim 26]

An image forming apparatus remote management system including

one or a plurality of image forming apparatuses, an intermediate device connected to the image forming apparatuses, and a server device for remotely managing the image forming apparatuses through the intermediate device, characterized in that the intermediate device transmits, to the server device, data describing a client side request corresponding to a newly generated intermediate device side request and a response to a server device side request corresponding to a request to the intermediate device and receives, from the server device, data describing a response to the client side request and a newly generated server device side request at the server device.

[Claim 27]

The image forming apparatus remote management system according to claim 26, characterized in that the intermediate device executes the server device side request and transmits a response to the server device side request, which is output as a result of the execution.

[Claim 28]

An image forming apparatus remote management system including one or a plurality of image forming apparatuses, an intermediate device connected to the image forming apparatuses, and a server device for remotely managing the image forming apparatuses through the intermediate device, characterized in that the intermediate device comprises:

a storing means including a first memory area for storing a server device side request corresponding to a request to the agent device in association with a response to the request from the intermediate device and a second memory area for storing a client side request corresponding to a request from the intermediate device;

a request generation means for generating the client side request and storing the request in the second memory area of the storing means;

a response generation means for reading a server device side request from the first memory area of the storing means, generating and storing a response to the request in the first memory area;

a request collection means for reading a response generated by the response generation means from the first memory area and reading a client side request generated by the request generation means from the second memory area;

a request output means for transferring a request including a response to the read server device side request and a client side request to the server device connected by the intermediate device through a communication network;

a response acquisition means for acquiring a response including the server device side request and a response to the client side request from the connected server device; and

a response distribution means for storing a server device side request included in the acquired response to the first memory area of the storing means and specifying a client side request of the second memory area corresponding to a response to the client side request contained in the response.

[Claim 29]

An image forming apparatus remote management system including one or a plurality of image forming apparatuses, an intermediate device connected to the image forming apparatuses, and a server device for remotely managing the image forming apparatuses through the intermediate device, characterized in that the intermediate device comprises:

a storing means including a first memory area for storing a server device side request corresponding to a request to the agent device, a response to the request from the intermediate device, and the request identification information of the request in association with each other, and a second memory area for storing a client side request corresponding to a request from the

intermediate device and the request identification information of the request in association with each other;

a request generation means for generating the client side request, assigning the request identification information for identifying the request, and storing the request in the second memory area of the storing means;

a response generation means for reading a server device side request from the first memory area of the storing means, generating a response to the request, and storing in the first memory area the response and the request identification information of the server device side request in association with each other;

a request collection means for reading the association of a response generated by the response generation means and the request identification information of the server device side request corresponding to the response from the first memory area, and reading the association of a client side request generated by the request generation means and the request identification information of the request from the second memory area;

a request output means for transferring a request including the association of a response to the read server device side request and the request identification information of the request and the association of a client side request and the request identification information of the request to the server device connected by the intermediate device through a communication network;

a response acquisition means for acquiring, from the connected server device, a response including the association of the server device side request and the request identification information of the request and the association of a response to the client side request and the request identification information of the request; and

a response distribution means for storing the association of

a server device side request included in the acquired response and the request identification information of the request to the first memory area of the storing means, checking the request identification information associated with a response to the client side request included in the response with the request identification information of the request, assigned to each client side request in the second memory area, and specifying a client side request in the second memory area, which corresponds to a response to the client side request.

[Claim 30]

The image forming apparatus remote management system according to claim 4, characterized in that the request collection means periodically reads from the first and second memory areas.

[Claim 31]

The image forming apparatus remote management system according to claim 29, characterized in that:

the request collection means serializes, in accordance with a code defined with a predetermined address, the read association of a response to a server device side request and the request the identification information of the server device side request corresponding to the response and the read association of a client side request and the request identification information;

the request output means including in the request and transfers to the server device the serialized association of a response to a server device side request and the request identification information of the server device side request corresponding to the response and the serialized association of a client side request and the request identification information;

the response acquiring means acquires, from the server device, the response including the association of the server device side request and the request identification information and the association of the client side request and the request identification information, wherein both of the association are

serialized in accordance with a code defined with a predetermined address; and

the response distribution means breaks down, in accordance with a code defined by a predetermined address, the association of the server device side request and the request identification information and the association of a response to the client side request and the request identification information, wherein both of the association are included in the acquired response.

[Claim 32]

The image forming apparatus remote management system according to claim 31, characterized in that the request collection means serializes the request identification information of the read server device side request and the request identification information of the client side request as a SOAP header, and serializes a response to the read server device side request and a client side request as a SOAP body.

[Claim 33]

The image forming apparatus remote management system according to claim 32, characterized in that the intermediate device includes an attachment processing means for setting a link between the serialized association of a client side request and the request identification information and the serialized association of a response to a server device side request and the request identification information and associating each other.

[Detailed Description of the Invention]

[0001]

[Technical Field]

The present invention relates to an intermediate device, an intermediate device control program and a medium for recording thereof, an intermediate device control method, and an image forming apparatus remote management system, and particularly an intermediate device connected with a server device for remotely managing a copier, a printer, and so forth via a communication

network, an intermediate device control program & a medium for recording thereof, an intermediate device control method, and an image forming apparatus remote management system.

[0002]

[Background Art]

As a remote management system for an image forming apparatus, a system is known, in which an intermediate device being connected with one or a plurality of image forming apparatuses is installed in an office of an unspecified client, and a server device installed in a service center being a basis for the sales and service communicates with the intermediate device, thereby an image forming apparatus connected to the intermediate device is remotely managed.

[0003]

Then, the intermediate device and the image forming apparatuses provide each of the services for a printer, a copier, a facsimile, a scanner, and so forth, or are installed with an application program for managing the operating status, wherein many of the apparatuses are configured to control the program to activate or stop by an RPC (remote procedure call) from the server device. The office of a customer generally install a firewall for shut down an illegal access from outside and only one-way access from the intermediate device installed inside of the offices of customers to the server devices. Therefore, as a conventional means, polling is made on a regular basis from the intermediate device to the server device and a request from a server device is transferred to an intermediate device as a response from the polling. There is no prior art document to be described.

[0004]

[Problems to be Solved by the Invention]

However, in a case of using such a conventional means, if the intermediate device having received a request does not carry out polling to the server device, a response to the request may not be sent back. Specifically, in order to materialize one cycle in which a request generated at the server side is acquired by an intermediate

device or an image forming apparatus connected to the intermediate device and a response being a process result to the request is returned again to the sever apparatus, two connections have to be established to the intermediate device and to the server device, whereby efficiency in data communication is a problem.

[0005]

Then, there has been a request for a more efficient data communication system by providing an intermediate device capable of transferring a request from the intermediate device or an image forming apparatus to a server device and a process result to the request received from the server device by lapping and filling the request and the process result in polling of the intermediate device.

[0006]

[Objects of the Invention]

The present invention worked out under the situation has an object to provide an intermediate device capable of sending back a request including a request from the intermediate device or an image forming apparatus to a server device and a process result to a request received before from the server side, at a time of polling from the intermediate device.

[0007]

[Means for solving the problems]

To solve the problem, in an intermediate device connected with a server device, the present invention is configured as shown in the following.

[0008]

The invention of claim 1 is characterized by transmitting, to the server device, data describing a client side request corresponding to a newly generated request of an intermediate device side and a response to a server device side request corresponding to a request to the intermediate device, and receiving, from the server device, data describing a response to the client side request and a newly generated server device side

request at the server device.

[0009]

The invention of claim 2 is characterized by executing the server device side request and transmitting a response to the server device side request being output as a result of the execution.

[0010]

For solving the problem, in an intermediate device connected with a server device, the present invention is configured as described in the following.

[0011]

In the invention of claim 3, an intermediate device includes a storing means including a first memory area for storing a server device side request corresponding to a request to the intermediate device and a response from the intermediate device to the request in association with each other, and a second memory area for storing a client side request corresponding to a request from the intermediate device, a request generation means for generating the client side request and storing the request to the second memory area of the storing means, a response generation means for reading a server device side request from the first memory area of the storing means, generating a response to the request, and storing to the first memory area, a request output means for transferring a request including a response to the read server device side request and the client side request to the server device connected by the intermediate device via a communication network, a response acquisition means for acquiring a response including the server device request and a response to the client side request from the connected server device, and a response distribution means for storing the server device request included in the acquired response to the first memory area of the storing means and specifying the client side request of the second memory area corresponding to a response to the client side request

contained in the response.

[0012]

For solving the problem described in above, in an intermediate device connected to a server device, the present invention is configured as described in the following.

[0013]

The invention according to claim 4 includes a storing means including a first memory area for storing a server device side request corresponding to a request to the intermediate device, a response from the intermediate device to the request, and the request identification information of the request in association with each other, and a second memory area for storing a client request corresponding to a request from the intermediate device and the request identification information of the request in association with each other, a request generation means for generating the client side request, assigning the request identification information for identifying the request, and storing in the second storing area of the storing means, a response generation means for reading a server device side request from the first storing area of the storing means, generating a response to the request, and storing the response and the request identification information of the server device side request in association with each other in the first storing area, a request collection means for reading the association of the response generated by the response generation means and the request identification information of the server device side request corresponding to the response from the first storing area, and reading the association of the client side request generated by the request generation means and the request identification information of the request from the second storing area, a request output means for transferring a request including the association of a response to the read server device side request and the request identification information of the request and the association of

a client request and the request identification information of the request, to the server device connected by the intermediate device through a communication network, a response acquisition means for acquiring, from the connected server device, a response including the association of the server device side request and the request identification information of the request and the association of a response to the client side request and the request identification information of the request, and a response distribution means for storing the association, included in the acquired response, of the server device side request and the request identification information of the request, in the first storing area of the storing means, checking the request identification information associated with the response to the client side request included in the response and the request identification information of the request assigned to each client side request in the second storing area, and specifying the client side request in the second storing area, corresponding to the response to the client side request.

[0014]

In the invention of claim 5, the request collection means periodically reads from the first storing area and the second storing area. Herein, "periodically" means, for example, a case in which it means every predetermined period of time. A method for periodically reading includes a method for reading by using a timer. Also, other than in above, "periodically" means a case in which it means every predetermined time, too.

[0015]

In the invention of claim 6, the request collection means serializes, in accordance with a code defined by a predetermined address, the read association of a response to a server device side request and the request identification information of the server device side request corresponding to the response, and the read association of a client side request and the request

identification information, the request output means contains in the request and transfers to the server device, the serialized association of a response to a server device side request and the request identification information of the server device side request corresponding to the response and the serialized association of a client side request and the request identification information, the response acquisition means acquires the response including the association serialized in accordance with a code defined with a predetermined address, of the server device side request and the request identification information and the association serialized in accordance with a code defined with a predetermined address, of a response of the client side request and the request identification request, and the response distribution means breaks down, in accordance with a code defined with a predetermined address, the association included in the acquired response, of the server device side request and the request identification information and the association included in the acquired response, of a response to the client side request and the request identification information.

[0016]

The invention of claim 7 serializes the request identification information of the read server device side request and the request identification information of the read client side request as a SOAP header and the response to the read server device side request and the client side request as a SOAP body.

[0017]

In the invention of claim 8, an attachment processing means sets a link between the serialized association of a response to a server device side request and the request identification information and the serialized association of a client side request and the request identification information and associates each other.

[0018]

The invention of claim 9 is an intermediate device control program for causing the invention of claim 1 to be executed.

[0019]

The invention of claim 10 is an intermediate device control program for causing the invention of claim 2 to be executed.

[0020]

The invention of claim 11 is an intermediate device control program for causing the invention of claim 3 to be executed.

[0021]

The invention of claim 12 is an intermediate device control program for causing the invention of claim 4 to be executed.

[0022]

The invention of claim 13 is an intermediate device control program for causing the invention of claim 5 to be executed.

[0023]

The invention of claim 14 is an intermediate device control program for causing the invention of claim 6 to be executed.

[0024]

The invention of claim 15 is an intermediate device control program for causing the invention of claim 7 to be executed.

[0025]

The invention of claim 16 is an intermediate device control program for causing the invention of claim 8 to be executed.

[0026]

The invention of claim 17 is a control method for causing a general-purpose computer to execute the same operation of the invention of claim 1.

[0027]

The invention of claim 18 is a control method for causing a general-purpose computer to execute the same operation of the invention of claim 2.

[0028]

The invention of claim 19 is a control method for causing a general-purpose computer to execute the same operation of the invention of claim 3.

[0029]

The invention of claim 20 is a control method for causing a general-purpose computer to execute the same operation of the invention of claim 4.

[0030]

The invention of claim 20 is a control method for causing a general-purpose computer to execute the same operation of the invention of claim 4.

[0031]

The invention of claim 21 is a control method for causing a general-purpose computer to execute the same operation of the invention of claim 5.

[0032]

The invention of claim 22 is a control method for causing a general-purpose computer to execute the same operation of the invention of claim 6.

[0033]

The invention of claim 23 is a control method for causing a general-purpose computer to execute the same operation of the invention of claim 7.

[0034]

The invention of claim 24 is a control method for causing a general-purpose computer to execute the same operation of the invention of claim 8.

[0035]

The invention of claim 25 is a computer readable storing medium, in which the control programs according to claims 9 to 16 are stored.

[0036]

The invention of claim 26 is an image forming apparatus remote

managing system including the invention of claim 1.

[0037]

The invention of claim 27 is an image forming apparatus remote managing system including the invention of claim 2.

[0038]

The invention of claim 28 is an image forming apparatus remote managing system including the invention of claim 3.

[0039]

The invention of claim 29 is an image forming apparatus remote managing system including the invention of claim 4.

[0040]

The invention of claim 30 is an image forming apparatus remote managing system including the invention of claim 5.

[0041]

The invention of claim 31 is an image forming apparatus remote managing system including the invention of claim 6.

[0042]

The invention of claim 32 is an image forming apparatus remote managing system including the invention of claim 7.

[0043]

The invention of claim 33 is an image forming apparatus remote managing system including the invention of claim 8.

[0044]

These inventions are to achieve the objects mention in above.

[0045]

[Description of the Preferred Embodiments]

Hereinafter, a preferred embodiment 1 of the present invention is described with reference to Figs. 1 to 15.

[0046]

Fig.1 is a block diagram illustrating a configuration example of an image forming apparatus remote management system according to an embodiment of the present invention.

[0047]

The image forming apparatus remote management system includes an image forming apparatus 100 (a copier, and so forth) as an apparatus being remotely managed, an intermediate device 101 connected with the image forming apparatus 100, and further a server device 102 connected via the intermediate device 101 and a communication network 103, and causes the server device 102 to perform remote management of each of image forming apparatuses 100 intensively via the intermediate device. The intermediate device 101 and the image forming apparatuses 100 have a various layer configuration corresponding to the usage environment. For example, in the setting environment A shown in Fig. 1, the intermediate device 101a capable to establish direct connection with the server device 102 by an HTTP (hyper text transfer protocol) has a configuration of a simple layer under which an image forming apparatus 100a and an image forming apparatus 100b follow as apparatuses being remotely managed. However, in the setting environment B shown in Fig. 1, since four units of image forming apparatuses 100 are set, a load becomes large when only one unit of the intermediate device 101 is installed. Therefore, an intermediate device 101b capable of establishing direct connection with the server device 102 by an HTTP forms a layer configuration in which, not only the image forming apparatuses 100c and 100d, but also other intermediate device 101c follow, and the intermediate device 101c has the image forming apparatuses 100e and 100f follow further. In this case, information emitted from the server device 102 in order to remotely manage the image forming apparatuses 100e and 100f reaches the image forming apparatuses 100e or 100f via the intermediate device 101b and the intermediate device 101c being the lower node. In each installation environment, a firewall 104 is installed considering a security point.

[0048]

The image forming apparatus 100 of the present embodiment has installed application programs for providing services of a copier, a facsimile, a scanner, and so forth. The intermediate device 101

has installed an application program for managing and controlling the image forming apparatus 100 connected thereof.

[0049]

The server device 102 has installed an application program for managing and controlling each intermediate device 101 and further for managing and controlling the image forming apparatus 100 via the intermediate device 101. Then, each node of the present embodiment is configured to be capable of sending a 'request' which is a process request to a method of an application program being installed each other and acquiring a 'response' which is a result of the requested process, by an RPC (remote procedure call). Specifically, the intermediate device 101 or the image forming apparatus 100 connected to thereof generates a request to the server device 102 (hereinafter, referred to as a client side request) and transmits the request to the server device 102, wherein a response to the request may be acquired, while the server device 102 generates a request to the intermediate device side (hereinafter, referred to as a server device side request) and transmits the request to the intermediate device side, whereby a response to the request may be acquired.

[0050]

The relationship is described in detail using a conceptual diagram of a data sending/receiving model shown in Fig. 2.

[0051]

Fig. 2(A) shows a case in which the image forming apparatus 100 generates a request to the server device 102. In this case, a model is that the image forming apparatus 100 generates a client side request a and the server device 102 which has received the request through the intermediate device 101 returns a response a to the request. Another case may be considered, wherein a plurality of the intermediate device 101 shown in Fig. 2(A) are provided (the image forming apparatus 100e or 100f shown in Fig. 1). Fig. 2(A) displays a case in which not only the response but also response delay notification a' are returned. As described in details afterwards, this is because the

configuration is such that the server device 102 receives a client side request from the connected intermediate device 101, and when it is judged that a response to the request may not be returned during the connection therewith, a response delay notification is informed and the connection is once cut out and a response to the request is returned in the time of a next connection.

[0052]

Fig. 2(B) is a case in which the intermediate device 101 generates a request to the server device 102. In this case, a model is that the intermediate device 101 generates, for example, a client side request b and the server device 102 which has received the request returns a response b to the request. As same in the case in Fig. 2(A), when a response may not be returned immediately, a response delay notification b′ is returned in the case of Fig. 2(B).

[0053]

Fig. 2(C) is a case in which the server device 102 generates a request to the image forming apparatus 100. In this case, a model is that the sever apparatus 102 generates, for example, a server device side request c and the image forming apparatus 100 which has received the request returns a response c to the request. As same in the case in Fig. 2(A), when a response may not be returned immediately, a response delay notification c′ is returned in the case of Fig. 2(C).

[0054]

Fig. 2(D) is a case in which the server device 102 generates a request to the intermediate device 101. In this case, a model is that the sever apparatus 102 generates, for example, a server device side request d and the intermediate device 101 which has received the request returns a response d to the request. As same in the case in Fig. 2(A), when a response may not be returned immediately, a response delay notification d′ is returned in the case of Fig. 2(D).

[0055]

In the cases of Figs. 2(A) and 2(B), immediately after a request is generated, the intermediate device 101 establishes a connection

with the server device 102 and may transfer the request being included in an HTTP request. However, in the cases of Figs. 2(C) and 2(D), since a firewall 104 installed in the intermediate device side shuts out an HTTP request from the server device 102, the request may not be immediately transferred by accessing from the server side to the intermediate device 101. In the present embodiment, a specific process of a message collection and distribution is performed, whereby transfer of the request even in the cases of Figs. 2(C) and 2(D) is smoothly performed.

[0056]

Also, as described in detail later, in the preset embodiment, SOAP (simple object access protocol) is used as a protocol for transmitting the argument and return value of an RPC.

[0057]

Next, in the physical configuration of the server device 102 shown in Fig. 1, the server device 102 includes a CPU not shown, a ROM, a RAM, a nonvolatile memory, a network interface card (hereinafter, referred to as NIC), and so forth.

[0058]

Further, in the physical configuration of each of the image forming apparatus 100 shown in Fig. 1, the image forming apparatus 100 includes a CPU not shown, a real time clock circuit, a ROM, a RAM, a nonvolatile memory, a input/output port, a serial communication control unit, a system bus, and so forth.

[0059]

A physical configuration of the intermediate device 101 shown in Fig. 1 is described with reference to Fig. 3. The intermediate device 101 includes a CPU300, a ROM301, a RAM302, a nonvolatile memory 303, a NIC304, and so forth. The detail of these component parts is described in the following. The CPU300 generally controls the entire intermediate device 101 by a control program in the ROM301. Then, the ROM301 is a read-only memory for storing various fixed data including a control program being used by the CPU300. The RAM302 is

a temporary memory being used as a working memory when the CPU300 performs a data processing. The nonvolatile memory 303 is a storage memory which maintains a memory content even if the power source of the server device 101 is off. A part area of the nonvolatile memory 303 is secured as a command-pool 400, and further, another area is secured as a request-pool 401. The contents of the command-pool 400 and the request-pool 401 are described in detail later in the operation description column. The NIC304 performs information receiving/sending with the server device 120 via the communication network 103.

[0060]

Fig. 4 is a functional outline diagram of a process which the CPU300 executes for realizing a message distribution and collection process being a characteristic process of the present embodiment. For realizing the message distribution and collection process, the CPU300 functions as a request output means 406, a response acquisition means 407, a request collection means 405, a response distribution means 408, a request generation means 403, a response generation means 404, and an attachment process means 409.

[0061]

First, each function of these means is described briefly.

[0062]

The intermediate device 101 includes a memory means 402 providing the command-pool 400 and the request-pool 401, the request generation means 403, the response generation means 404, the request collection means 405, the request output means 406, the response acquisition means 407, the response distribution means 408, and the attachment process means 409. The command-pool 400 corresponds to the first memory area and the request-pool corresponds to the second memory area. For example, the memory means 402 including the command-pool 400 and the request-pool 401 corresponds to, for example, a ROM, a RAM, an HDD, and so forth. Also, the request generation means 403, the response generation means 404, the request collection means 405, the request

output means 406, the response acquisition means 407, the response distribution means 408, and the attachment process means 409 correspond to a CPU.

[0063]

Further, Fig. 4 is described in detail, herein. In the command-pool 400, a request at server side, a response to the request, and request identification information of the request are associated with each other and registered. Also, in the request-pool 401, a request at side and request identification information of the request are associated with each other and registered.

[0064]

The request generation means 403 generates a request at client side, allocates request identification information for identifying the request, and registers the information to the request-pool 401 of the storing means 402. For example, it is considered that the request generation means 403 performs generation based on a request generation application for generating the client side request. The request generation application is stored in a predetermined area of the storing means 402, and the request generation means 403 reads the request generation application from the predetermined area of the storing means 402 and generates a client side request. Also, it is consider that the request generation means 403 attaches a priority order for execution in priority to the server device 102 to a generated client side request.

[0065]

Herein, a client side request to be registered to the request-pool 401 is described referring to Fig. 5.

[0066]

Fig. 5 shows a data configuration of a table illustrating an example of a request sheet in which a client side request registered in a request-pool, request identification information, and management information for managing the request are associated with each other. The request sheet is a table in which a client side request and

information related to the request are associated with, and is registered in the request-pool 401. As shown in Fig. 5, the client side request includes "method name" and "input parameter". Also, the management information includes "request ID", "identification information of request initiating side", "status", "center response", and "response handler". "Method name" of the request is a content of a request to the server device 102. "Input parameter" is data attached to the name of a method. "Request ID" is information for identifying a client side request. "Identification information of request initiating side" is identification information for specifying the request initiating side. "Status" is a status of a process to a client side request. Herein, "status" transits, according to the progress of a process, such as "not transmitted" → "waiting for response" → "response delay" → "response received", or "not transmitted" → "waiting for response" → "response received". In the "center response", information indicating having received a response is registered when the response has been received. Nothing is in until a response is received from the server device 102. "Response hander" is reference information to the response hander being a service for processing a request.

[0067]

Herein, in Fig. 4, the response generation means 404 reads a request of server side from the command-pool 400 of the storing means 402, generates a response to the request, and registers to the command-pool 400 by associating the response with the request identification information of the server device side request. For example, it is considered that the response generation means 404 performs generation based on a response generation application for generating the response. The response generation application is stored in a predetermined area of the storing means 402, and the response generation means 404 reads the response generation application from the predetermined area of the storing means 402 and generates a response. Also, it is considered that the response generation means 404 reads a plurality of server

device requests from the command-pool 400 of the storing means 402 and generates a response for each of server device side requests. Also, when a server device side request includes a priority order for executing a process in priority to the intermediate device 101, it is considered that the response generation means 404 reads a server device side request from the command-pool 400 of the storing means 402 in priority and generates a response.

[0068]

Herein, a server device side request being registered to the command-pool 400 is described referring to Fig. 6.

[0069]

Fig. 6 shows a data configuration of a table illustrating an example of a command sheet in which a server device side request registered in a command-pool, request identification information, and management information for managing the request are associated with each other. The command sheet is a table in which a server device side request and information related to the request are associated with, and is registered in the command-pool 400. As shown in Fig. 6, a server device side request includes "intermediate device addressed", "image forming apparatus addressed", "method name", and "input parameter". Also, management information includes "request ID", "status", "output parameter", and "center-command handler". "Intermediate device addressed" is identification information of the intermediate device 101 being a subject of a server device side request. "Image forming apparatus addressed" is identification information of the image forming apparatus 100 being a target of a server device side request. "Method name" is a content of a request to an apparatus addressed by the request. "Input parameter" is data attached to "method name". "Status" is a status of a process to a server device side request. Herein, "status" transits, according to the progress of a process, such as "not processed" → "process completed" → "responded", or "not processed" → "delay not informed" → "waiting for process" → "in process" → "process completed" → "responded". "Output parameter"

shows a response generated by the response generation means 404. Nothing is in until the "status" reaches "process completed". "Center-command handler" is reference information to a center-command handler being a service for processing a request.

[0070]

Herein, in Fig. 4, the request collection means 405 reads from the storing means 402 the association of a response generated by the response generation means 404 to the request the identification information of a server device side request corresponding to the response and reads from the request-pool 400 the association of a client side request generated by the request generation means 403 to the request identification information of the request as well. For example, when there exists a high priority order for execution in the response or the client side request, it is considered that the request collection means 405 reads responses in the order of higher priority for execution and client side requests in the order of higher priority for execution.

[0071]

The request output means 406 transfers to the server device 102 an HTTP request containing the association of a response to a read server device side request to the request identification information of the request and the association of a client side request to the request identification information of the request.

[0072]

The response acquisition means 407 acquires an HTTP response containing the association of a server device side request to the request identification information of the request and the association of a response to a client side request to the request identification information of the request from the server device 102 connected.

[0073]

The response distribution means 408 registers the association of a server device side request to the request identification information of the request contained in the acquired HTTP response to the

command-pool 400 of the storing means 402, checks the request identification information associated with a response to a client side request contained in the HTTP response and the request identification information of the request being allocated to each client side request at the request-pool 401, and specifies a client side request of the request-pool 401 corresponding to the response to the client side request.

[0074]

Also, the request collection means 405 periodically reads the association of a response from the storing means 402 to the request identification information of the server device side request corresponding to the response and the association of a client side request from the request-pool 401 to the request identification information of the request. For example, reading in every 60 minutes by a timer is considered.

[0075]

The request collection means 405 serializes in accordance with an identified code in a predetermined address the read association of a response to a server device side request to the request identification information of the server device side request corresponding to the response and the association of a client side request to the request identification information. The request output means 406 transfers the serialized association of a response to a server device side request to the request identification information of a server device side request corresponding to the response and the association of a client side request to the request identification information to the server device 102 by containing these associations in an HTTP request. The response acquisition means 407 acquires from the server device 102 an HTTP response containing the association of a server device side request to the request identification information and the association of a response to a client side request to the request identification information, both of which are serialized in a predetermined address in accordance with

a defined code. The response distribution means 408 breaks down the association of a server device side request to the request identification information and the association of a response to a client side request to the request identification information, both of which are contained in the acquired HTTP response, in accordance with a defined code to a predetermined address. For example, it is considered that the association of a response to a server device side request to the request identification information corresponding to the response and the association of a client side request to the request identification information, both of which are read by the request collection means 405, are converted by an XML (eXtensible Markup Language) document conversion program stored in a predetermined area of the storing means 402.

[0076]

The request collection means 405 serializes request identification information of a server device side request and request identification information of a client side request, both of which are read, as a SOAP header, and serializes a response to a server device side request and a client side request, both of which are read, as a SOAP body. In SOAP communication, a XML message attached with supplemental information called an envelope (mailer) is converted in a protocol such as an HTTP and so forth.

[0077]

Herein, an HTTP request code of the present embodiment is described using Fig. 7.

[0078]

Fig. 7 is a conceptual diagram illustrating an example of an HTTP request code of the present embodiment. The HTTP request being transmitted by the intermediate device 101 to the server device 102 in the present embodiment includes a plurality of multipart in accordance to a MIME (multipurpose internet mail extension), and each of SOAP envelops written in the XML is embedded in each of the multipart. In the example of Fig. 7, each element divided by "MIME_boundary" makes

up a first part, a second part, a third part, and the fourth part for the HTTP body of the HTTP request. However, the upper limit of the parts which may be contained in the SOAP body may be four pieces and over.

[0079]

Herein, specific examples of SOAP envelops being embedded in the HTTP request and the HTTP response for being transferred are described.

[0080]

Fig. 8 shows a SOAP envelope in which an example of a client side request is written. The envelope is for describing a client side request read at the request collection process. First, according to Fig. 8, an address defining a name space is specified as an attribute associated with the "envelope". In the example of Fig. 8, unique name space definition is performed in addresses of "www.aaaa" and "www.bbbb" other than a name space defined by SOAP as a standard. Therefore, as for a XML tag attached with a name space prefix of "n", the address of "www.aaaa" is referred, and as for a XML tag attached with a name space prefix of "ns", the address of "www.bbbb" is referred, whereby the structures of the XML tags and definition of the data patterns to be transferred may be acquired. In the "SOAP header" in Fig. 8, "12345" is described in the XML tag of "request ID". Also, in the XML tag of the "intermediate device ID" for specifying the transmitting side of the message, "xxxx" is described. Also, in the "SOAP body", information for specifying a method described in the "method name" in the request sheet, or argument described in "input parameter", and so forth is described.

[0081]

Fig. 9 shows a SOAP envelope in which an example of a response to a client side request is described. The envelope is for describing a response read in the response collection process. The definition of name spaces is same as in Fig. 8. In the "SOAP header" of Fig. 9, "12345" is described in the XML tag of the "request ID" of a client side request. Also, in the XML tag of the "intermediate device ID"

being an address of the response, "xxxx" is described. A XML tag of a "status" which shows whether the response is a delay-notice or not, is s. When the "status" tag shows "OK", the response is described in the "SOAP body". On the other hand, when the "status" tag shows "Delay", the response is a delay-notice. In the "SOAP body", when the "status" tag shows "OK", information to the response is described. On the other hand, the "status" tag shows "Delay", it is configured that nothing is described in the "SOAP body".

[0082]

Fig. 10 shows a SOAP envelop in which an example of a server device side request is described. In the attribute of a "Envelope" XML tag, a name space is defined. As in Fig. 8 and Fig. 9, by referring these definitions of name spaces, structures of XML tags and information of data types to be transferred may be acquired in Fig. 10 too. In the "SOAP header" in Fig. 10, "10000000" is described in the XML tag of the "request ID" of a server device side request. Also, in the XML tag of the "intermediate device ID" being the address of the message, "xxxx" is described. In this case, since this is not a message to the image forming apparatus 100, "NONE" is described in the tag of the "intermediate device ID". Herein, a case wherein the addresses of messages are all to the intermediate device 101 is considered, and in this case, "ALL" is described in the tag of the "intermediate device ID". Also, when the message addresses are all to the image forming apparatus 100, "ALL" is described in the tag of the "image forming apparatus ID".

[0083]

Fig. 11 shows a SOAP envelope in which an example of a response to a server device side request is described. First, in an attribute of an "Envelope" XML tag, a name space is defined. Referring to the definition of a name space, an XML tag structure or information of the data type being transferred may be acquired as same as in Figs. 8 to 10. Also, in the "SOAP header" shown in Fig. 11, "10000000" is described in a "request ID" XML tag of the server device side request.

Also, in an "Intermediate device ID" tag for specifying the response transmitting side, "xxxx" is described. Also, even when the transmitting side of the response is the image forming apparatus 100, an ID such as "yyyy" is described in an "image forming apparatus ID" tag for specifying the transmitting side. However, in Fig. 11, since the image forming apparatus 100 is not transmitting a response, "NONE" is described in the "Image forming apparatus ID" tag. Also, there exists a "status" tag for showing whether the response is a delay notification or not. When "OK" is described in the "status" tag, the response is described in the "SOAP body". On the other hand, when "Delay" is described in the "status" tag, the response is a delay notice. In the "SOAP body", information to a response is described when the "status" tag shows "OK". On the other hand, when the "status" tag shows "Delay", it is configured that nothing is described in the "SOAP body".

[0084]

As describe in above, the SOAP envelopes which is contained in an HTTP request for being transferred includes one in which a client side request is described and one in which a response to a server device side request is described. The SOAP envelopes which is contained in an HTTP response for being transferred includes one in which a server device side request is described and one in which a response to a client side request is described.

[0085]

Going back to Fig. 4, the intermediate device 101 includes an attachment process means 409 for setting a link to assocation of a response to the serialized server device side request to request identification information for associating these, in order to associate a serialized client side request with request identification information.

[0086]

Next, an operation of the present embodiment is described referring to Figs. 12 to 15. An intermediate device in which an intermediate

device control program is embedded executes each of the following steps.

[0087]

First, a flow of a basic operation of request collection and distribution process is described using Fig. 12.

[0088]

As shown in Fig. 12, the request output means 406 transmits the HTTP request explained in Fig. 7 to the server device 102 (S1200). Next, an HTTP response to the HTTP request is received from the server device 102 (S1201). Next, the response distribution means 408 divides the HTTP body of the received HTTP response into each part (S1202). Herein, though an HTTP request is described in Fig. 7, the HTTP response is also made up with each part in the same configuration. Specifically, division of each part herein means division into each element divided by "MIME_boundary". Also, herein, each part is break down. Next, the response distribution means 408 judges whether the SOAP envelope embedded in a first part of the HTTP response is one for describing a server device side request or not (S1203). When the SOAP envelope is a server device side request, a server device side request registration process is executed (S1204). Herein, when the SOAP envelope embedded in the first part of the HTTP response is not a server device side request, the response distribution means 408 performs notification of a response notification notice (S1205). Next, the request collection means 405 performs a collection process of a request to the sever apparatus 102 (S1206). Next, the request collection means 405 performs a collection process of a response to the serve apparatus 102 (S1207). Next, the request collection means 405 generates an HTTP request including all the parts based on the processes of S1206 and S1207 (S1208). Then, the request output means 406 transmits an HTTP request which is embedded by the SOAP request as a multipart to the server device 102 (S1209).

[0089]

As described in above, all the processes are completed.

[0090]

Next, each of the steps described in above is explained.

[0091]

Fig. 13 illustrates a flow of the detailed operations as described in S1201 to S1205. First, the response acquisition means 407 receives an FTTP response from the server device 102 (S1300). Next, the response distribution means 408 analyzes the SOAP body of the HTTP response and break down into parts (S1301). Next, the response distribution means 408 determines whether each of the dissolved parts is a response to the client side request or not (S1302). Next, the response distribution means 408 judges whether the response is a delay notice or not when the dissolved part is a response to the client side request (S1303). Next, the response distribution means 408 notifies the request-pool 401 when the response is judged as a delay notice (S1304). Next, the response distribution means 408 changes the "status" in the request sheet shown in Fig. 5 to "response delayed" (S1305).

[0092]

Next, the response distribution means 408 analyzes an XML of the break down part and converts to data when the response is judged not to be a delay notice (S1306). Next, the response distribution means 408 notifies the converted data to the request-pool 401 (S1307). Next, the response distribution means 408 responds the data to a response to the corresponding client side request from the server device 102, and changes the "status" of the request sheet to "response received" (S1308). Next, the response distribution means 408 performs a process based on a "response handler" of the request sheet (S1309). For example, a case wherein a "method name" of the client side request shown in Fig. 5 is "abnormal notice" is considered. When the content of a process service of the "response hander" is the process content in which an "abnormal notice" is sent to the server device 102 and a notice that a response to the "abnormal notice" has been received is sent to the image forming apparatus 100 being transmitting side

of the "abnormal notice", the response distribution means 408 sends the "abnormal notice" to the server device 102 based on the process service, and notifies the image forming apparatus 100 being the transmitting side of the "abnormal notice" that the response has been received. Next, the response distribution means 408 registers a server device side request and the request identification information to the command-pool 400, when the dissolved part is judged as it is not a response to the client side request in the step S1302 (S1310).

[0093]

Herein, a process after the step S1310 described in above in Fig. 13 is further described using Fig. 14.

[0094]

Fig. 14 is a flowchart illustrating an example of a flow of a process to a server device side request. First, the response generation means 404 judges, based on a "center command handler" registered in a command sheet, whether a response to the server device 102 may be generated within a predetermined period of time or not (S1400). Next, the response generation means 404 executes a process based on a "center command handler" registered in a command sheet, when it is judged that a response to the server device 102 may be generated within a predetermined period of time (S1401). Next, the response generation means 404 registers the result of the execution to an "output parameter" of a command sheet (S1420). Next, the response generation means 404 changes a "status" of a command sheet to "process competed" (S1403). Next, in the step S1400, when the response generation means 404 judges that a response to the server device 102 may not be generated within a predetermined period of time, the response generation means 404 changes a "status" of a command sheet to a "delay not noticed", whereby the status becomes "waiting for a process" (S1404). Next, the response generation means 404 registers the command sheet which has been processed in the step S1403 or S1404 to the command-pool 400 (S1405). Herein, the response generation means 404 reads the command sheet of which "status" is "waiting for a process" and performs

processes after the step S1401 (S1406).

[0095]

Next, a detailed operation flow in the steps from S1206 to S1209 in Fig. 12 is described using Fig. 15.

[0096]

Fig. 15 shows a detailed operation flow in the steps from S1206 to S1209. First, the request collection means 405 collects the client side request of which "status" of the request sheet shown in Fig. 5 is "not transmitted" and the request ID of the request from the request-pool 401 (S1500). Next, the request collection means 405 converts the client side request of which "status" in the collected request sheet is "not transmitted" and the request ID to an XML document (S1501). Next, the request collection mans 405 generates a part in a transmission format containing the converted client side request in a "not transmitted" status and the request ID (S1502). Next, the request output means 406 transmits the generated part to the server device 102 (S1503). Next, to the client side request of which "status" in the request sheet registered in the request-pool 401 is "not transmitted", the request collection means 405 executes the steps from S1500 to S1502 and the request output means 406 executes the step S1503 (S1504). Next, the request collection means 405 collects a response to a server device request of which "status" in the command sheet shown in Fig. 6 is "process completed" or "delay not noticed" and the corresponding request ID from the command-pool 400 (S1505). When the "status" in the collected command sheet is "process completed", the request collection means 405 converts the response to the server device side request shown in Fig. 6 and the corresponding request ID to an XML (S1506). Next, the request collection means 405 generates a part of the converted response and the request ID (S1507). Next, the request output means 406 transmits the generated part to the server device 102 (S1508). Next, to a server device side request of which "status" in the command sheet stored in the storing means 402 is "process competed" or "delay not noticed", the request collection

means 405 executes steps from S1505 to S1507 and the request output means 406 executes the step S1508 (S1509). Also, in the next, when the "status" of the command sheet is "delay not noticed", the request collection means 405 creates a delay notice (S1510).

[0097]

With the above, a description of a process operation flow is completed.

[0098]

As described in above, according to the present embodiment, at the time of polling from the intermediate device 101, it is possible to send a request combined with a request from the intermediate device 101 and the image forming apparatus 100 to the server device 102 and a process result which has been received to a request from the server side.

[0099]

Also, the request collection means 405 may transmit periodically by periodically reading from the command-pool 400 and the request-pool 401.

[0100]

The request collection means 405 serializes in accordance with a code defined in a predetermined address the read association of a response to a server device side request to the request identification information of the server device side request corresponding to the response and the read association of a client side request to the request identification information, the request output means 406 transfers the serialized association to the server device 102, also, the response acquisition means 407 acquires from the server device 102 the association of a server device side request and the request identification information and the association of a response to the client side request and the request identification information, both of which are serialized in accordance with a code defined in a predetermined address, and the response distribution means 408 breaks down these associations in accordance with a code defined in a

predetermined address, whereby a request and a response may be transmitted without considering existence of a firewall 104 between the intermediate device 101 and the image forming apparatus 100, and the server device 102.

[0101]

Also, the request collection means 405 serializes request identification information of a read server device side request and request identification information of a client side request as a SOAP header, and serializes a response to the read server device side request and the client side request as a SOAP body, whereby a request and request information may be associated and transmitted to the server device 102.

[0102]

Also, for serialized association of a client side request and request identification information, a link for serialized association of a response to a server device side request and request identification information is provided, and by the attachment process means 409 for associating the above requests and information, related information may be referred.

[Embodiment 2]

[0103]

Hereinafter, second embodiment of the present invention is described using Fig. 16, wherein for the same configuration parts to the first embodiment, the identical numerals are assigned and the descriptions thereof are omitted. Fig. 16 is a block diagram illustrating an example of a configuration of an intermediate device. As shown in Fig. 16, the intermediate device 101 includes a storing means 402 providing with the command-pool 400 and the request-pool 401, a request generation means 403, a response generation means 404, a request collection means 405, a request output means 406, a response acquisition means 407, a response distribution means 408, an attachment process means 409, a request deletion means 1600 and a response deletion means 1601. Herein, the request deletion means 1600

and the response deletion means 1601 correspond to a CPU.

[0104]

The request deletion means 1600 monitors "status" of each request sheet registered in the request-pool 401, and when the request collection means 405 changes the "status" of the request sheet to "response receipt completed", deletes the request sheet from the request-pool 401.

[0105]

The response deletion means 1601 monitors "status" of each command sheet registered in the command-pool 400, and when the response distribution means 408 changes the "status" of the command sheet to "responded", deletes the command sheet from the command-pool 400.

[0106]

According to the second embodiment as described in above, the request deletion means 1600 receives a response from the server device 102, performs a process based on a "response hander" of a request sheet, and deletes a request sheet which becomes unnecessary from the request-pool 400, and along with the above, the response deletion means 1601 already transmits a response to the server device 102 and deletes an unnecessary command sheet from the command-pool 400, whereby the present invention may be efficiently used when the memory capacity is limited.

[0107]

Herein, the present invention is not limited to the embodiment in above. For example, in a request sheet generation step, a client side request may be converted to an XML document and registered to the request-pool 401. Also, in the command sheet generation step, "output parameter" may be converted to an XML document and registered in the command-pool 400.

[0108]

Also, information amount of "input parameter" of a request sheet being transmitted to the server device 102 may be limited. Further, information amount of "input parameter" of a command sheet being

received from the server device 102 may be limited.

[0109]

Also, the embodiment in above employs a SOAP as an upper protocol for realizing an RPC, wherein other protocols such as a CORBA (common object request broker architecture) and a JAVA(R)RMI(remote method invocation).

[0110]

Specifically, exchanging a request and a response thereof between an image forming apparatus and a server device is performed by a SOAP message described in an XML. However, it is not limited to an XML, but a message may be described by other formats.

[0111]

Also, in the embodiment as described in above, by employing not only a protocol of a SOAP standard, but also a unique protocol in addition, an SOAP envelope contained in an HTTP request or an HTTP response is handled as being a total independent envelope. However, it may be configured that a link to SOAP envelopes from second part onwards is embedded in first part SOAP envelope contained in an HTTP response by an SOAP attachment covered by the protocol of a SOAP standard.

[0112]

Further, as a data communication protocol in a lower position of the upper protocol such as an SOAP, the embodiment employs an HTTP. For the lower positioned protocol, other protocols such as SMTP (simple mail transfer protocol) and FTP (file transfer protocol) may be employed.

[0113]

[Effects of the Invention]

Since the present invention is configured and functions as described in above, a request combining a request from an intermediate device or an image forming apparatus to a server device and a process result to a request which has been received from a server device may be transmitted at a time of polling from the intermediate device.

[Brief Description of the Drawings]

[Fig. 1]

Fig. 1 is a block diagram illustrating a configuration of an image forming apparatus remote management system.

[Fig. 2]

Fig. 2 is a schematic diagram of a data transmission and receiving model.

[Fig. 3]

Fig. 3 is a block diagram illustrating an example of a physical configuration of an intermediate device.

[Fig. 4]

Fig. 4 is a block diagram illustrating an example of a configuration of an intermediate device.

[Fig. 5]

Fig. 5 is a data configuration of a table illustrating an example of a request sheet in which a client side request registered in a request-pool, request identification information and management information for managing the request are associated.

[Fig. 6]

Fig. 6 is a data configuration of a table illustrating an example of a command sheet in which a server device side request registered in a command-pool, request identification information and management information for managing the request are associated.

[Fig. 7]

Fig. 7 is a schematic diagram illustrating an example of a code for an HTTP request.

[Fig. 8]

Fig. 8 is a SOAP envelope in which a client side request is described.

[Fig. 9]

Fig. 9 is a SOAP envelope in which a response to a client side request is described.

[Fig. 10]

Fig. 10 is a SOAP envelope in which a server device side request is described.

[Fig. 11]

Fig. 11 is a SOAP envelope in which a response to a server device side request is described.

[Fig. 12]

Fig. 12 is a flow diagram illustrating an example of a basic operation of a request collection and a distribution process.

[Fig. 13]

Fig. 13 is a flow diagram illustrating an example of a detailed operation in Fig. 12.

[Fig. 14]

Fig. 14 is a flow diagram illustrating an example of a flow of a process to a server device side request.

[Fig. 15]

Fig. 15 is a flow diagram illustrating an example of a detailed operation in Fig. 12.

[Fig. 16]

Fig. 16 is a block diagram illustrating an example of a configuration of an intermediate device.

[Description of Numerals]

100 Image forming apparatus
101 Intermediate device
102 Server device
103 Communication network
104 Firewall
300 CPU
301 RAM
302 ROM
303 Nonvolatile memory
304 NIC
400 Command-pool
401 Request-pool

402 Storing means

403 Request generation means

404 Response generation means

405 Request collection means

406 Request output means

407 Response acquisition means

408 Response distribution means

409 Attachment process means

1600 Request deletion means

1601 Response deletion means

[Name of Document] Abstract of the Disclosure

[Abstract]

[Objectives of the Invention]

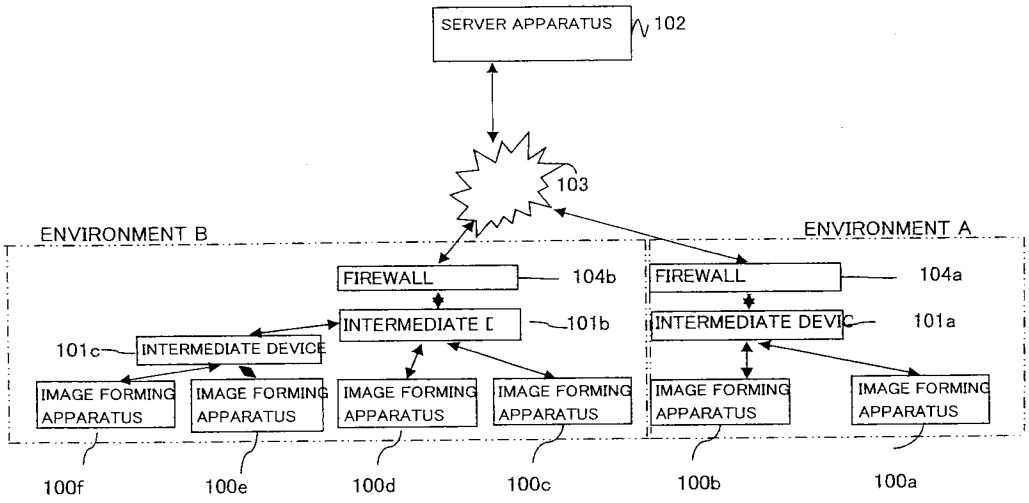
To transmit a request combining a request to a server device from an intermediate device or an image forming apparatus and a process result to a request which has been received from the server device at a time of polling from the intermediate device.

[Means for Achieving the Objectives]

An intermediate device including a storing means 402 providing the command-pool 400 and the request-pool 401, a request generation means 403, a response generation means 404, a request collection means 405, a request output means 406, a response acquisition means 407, and a response distribution means 408.

[Selected Drawing] Fig. 1

[Fig. 1]


SERVER APPARATUS
102
103
ENVIRONMENT B
ENVIRONMENT A
FIREWALL
104b
FIREWALL
104a
INTERMEDIATE [
101b
INTERMEDIATE DEVIC
101a
101c
INTERMEDIATE DEVICE
IMAGE FORMING APPARATUS
IMAGE FORMING APPARATUS
IMAGE FORMING APPARATUS
IMAGE FORMING APPARATUS
IMAGE FORMING APPARATUS
IMAGE FORMING APPARATUS
100f
100e
100d
100c
100b
100a

[Fig. 2]

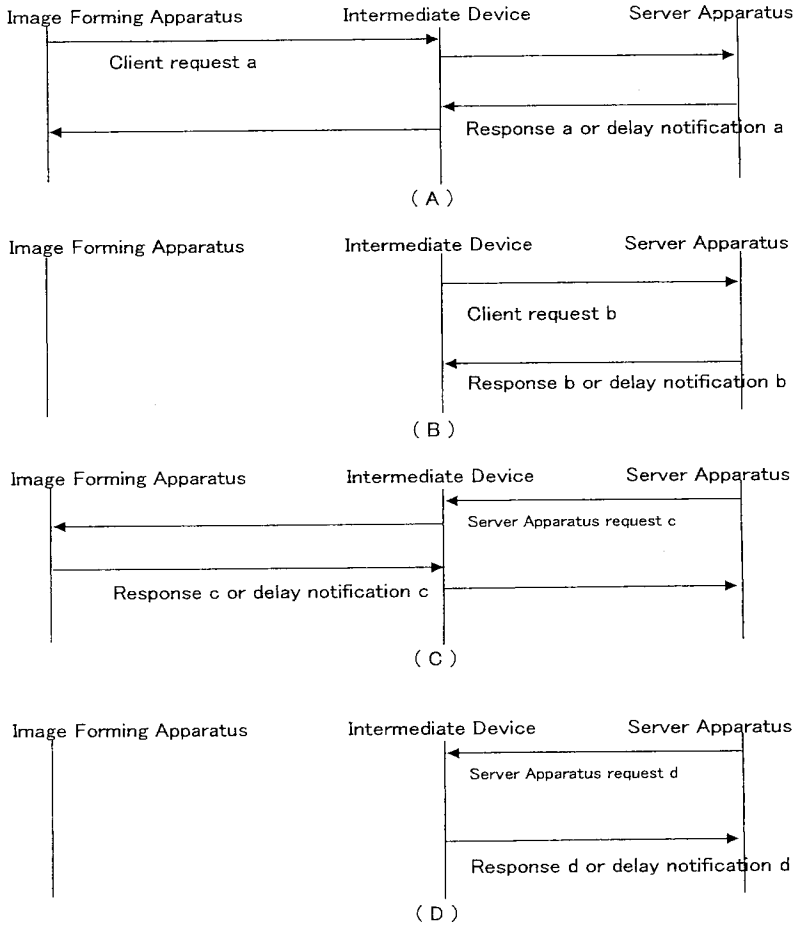
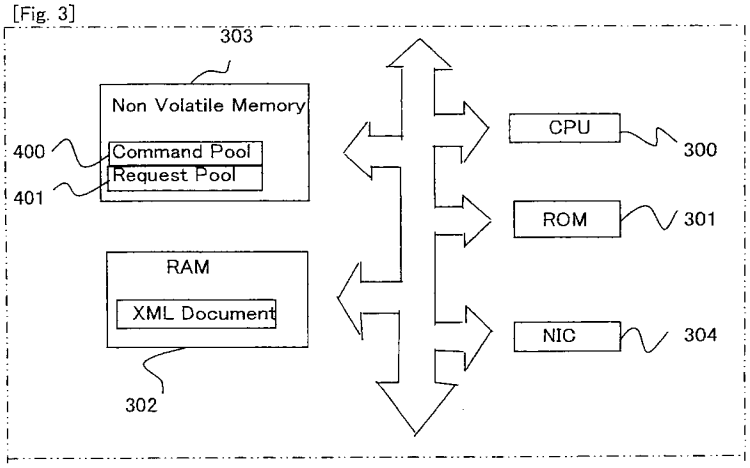
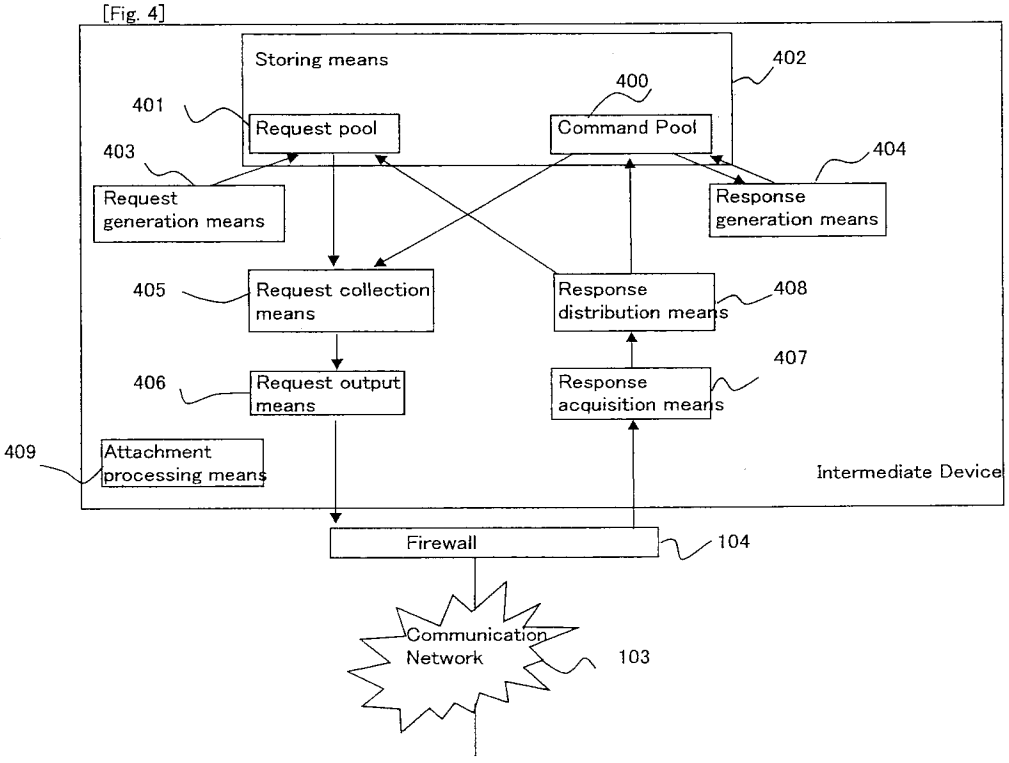


Image Forming Apparatus
Intermediate Device
Server Apparatus
Client request a
Response a or delay notification a
(A)
Image Forming Apparatus
Intermediate Device
Server Apparatus
Client request b
Response b or delay notification b
(B)
Image Forming Apparatus
Intermediate Device
Server Apparatus
Server Apparatus request c
Response c or delay notification c
(C)
Image Forming Apparatus
Intermediate Device
Server Apparatus
Server Apparatus request d
Response d or delay notification d
(D)

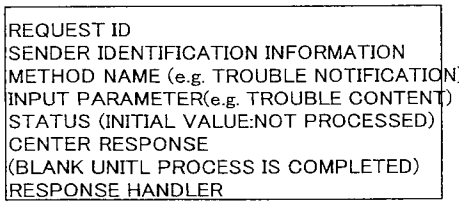
[Fig. 3]


303
Non Volatile Memory
400
Command Pool
401
Request Pool
RAM
XML Document
302
CPU
300
ROM
301
NIC
304

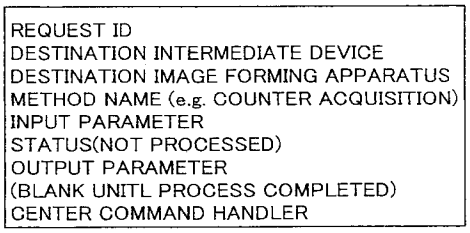
[Fig. 4]


Storing means
402
401
Request pool
400
Command Pool
403
Request generation means
404
Response generation means
405
Request collection means
Response distribution means
408
406
Request output means
Response acquisition means
407
409
Attachment processing means
Intermediate Device
Firewall
104
Communication Network
103

[Fig. 5]


REQUEST ID
SENDER IDENTIFICATION INFORMATION
METHOD NAME (e.g. TROUBLE NOTIFICATION)
INPUT PARAMETER(e.g. TROUBLE CONTENT)
STATUS (INITIAL VALUE:NOT PROCESSED)
CENTER RESPONSE
(BLANK UNITL PROCESS IS COMPLETED)
RESPONSE HANDLER

[Fig. 6]


REQUEST ID
DESTINATION INTERMEDIATE DEVICE
DESTINATION IMAGE FORMING APPARATUS
METHOD NAME (e.g. COUNTER ACQUISITION)
INPUT PARAMETER
STATUS(NOT PROCESSED)
OUTPUT PARAMETER
(BLANK UNITL PROCESS COMPLETED)
CENTER COMMAND HANDLER

[Fig. 7]

```
POST /aaa HTTP/1.1
Contest-Type:multipart/mixed:boundary=MIME_boundary
Content-Length:nnnn

 --MIME_boundary                                          ┐
Content-Type:text/xml;charset=UTF-8                       │
Content-Transfer-Encoding:8bit                            │ PART 1
SOAPAction:"SOAP Action URI"                              │
<s:Envelope>                                              │
  <--SOAP Request-->                                      │
</s:Envelope>                                             ┘

 --MIME_boundary                                          ┐
Content=Type:text/xml;charset=UTF-8                       │
Content=Transfer-Encoding:8bit                            │ PART 2
<s:Envelope>                                              │
  <--SOAP Response-->                                     │
</s:Envelope>                                             ┘

 --MIME_boundary                                          ┐
Content=Type:text/xml;charset=UTF-8                       │
Content=Transfer-Encoding:8bit                            │ PART 3
<s:Envelope>                                              │
  <--SOAP Response-->                                     │
</s:Envelope>                                             ┘

 --MIME_boundary                                          ┐
Content=Type:text/xml;charset=UTF-8                       │
Content=Transfer-Encoding:8bit                            │ PART 4
<s:Envelope>                                              │
  <--SOAP Response-->                                     │
</s:Envelope>                                             ┘

 --MIME_boundary
```

[Fig. 8]

```
Content-Type:text/xml;charset=UTF-8
Content-Transfer-Encoding:8bit

< s:Envelope
 xmlns:s="http://schemas.xmlsoap.org/soap/envelope/"
 xmlns:se="http://schemas.xmlsoap.org/soap/encoding/"
 xmlns:n="http://www.aaaa"
 xmlns:ns="http://www.bbbb"
 s:encodingStyle="http://schemas.xmlsoap.org/soap/encoding">

 < s:Header >
  < n: REQUEST >
   < REQUEST ID > 1 2 3 4 5 < / REQUEST ID >
   < SENDER >
    < INTERMEDIATE DEVICE ID > xxxx < / INTERMEDIATE DEVICE ID >
   < / SENDER >
  < /n: REQUEST >
 < /s:Header >

 < s:Body >
     Accompanying DATA
 < /s:Body >
< /s:Envelope >
```

[Fig. 9]

```
Content-Type:text/xml;charset=UTF-8
Content-Transfer-Encoding:8bit

< s:Envelope
 xmlns:s="http://schemas.xmlsoap.org/soap/envelope/"
 xmlns:se="http://schemas.xmlsoap.org/soap/encoding/"
 xmlns:n="http://www.aaaa"
 xmlns:ns="http://www.bbbb"
 s:encodingStyle="http://schemas.xmlsoap.org/soap/encoding">

 < s:Header >
  < n: RESPONSE >
   < REQUEST ID > 1 2 3 4 5 < / REQUEST ID >
   < DESTINATION >
    < INTERMEDIATE DEVICE ID > xxxx < / INTERMEDIATE DEVICE ID >
   < / DESTINATION >
   < STATUS > OK < /STATUS >
  < /n: RESPONSE >
 < /s:Header >

 < s:Body >
     Accompanying DATA
 < /s:Body >
< /s:Envelope >
```

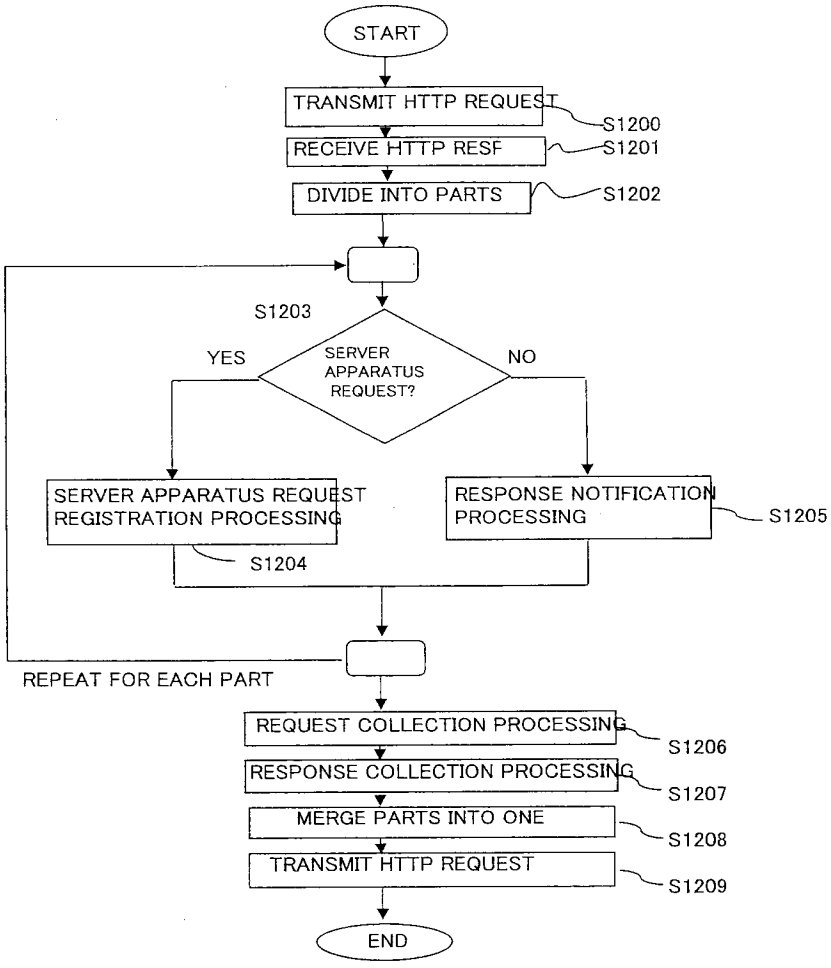
[Fig. 10]

```
Content-Type:text/xml;charset=UTF-8
Content-Transfer-Encoding:8bit

< s:Envelope
 xmlns:s="http://schemas.xmlsoap.org/soap/envelope/"
 xmlns:se="http://schemas.xmlsoap.org/soap/encoding/"
 xmlns:n="http://www.aaaa"
 xmlns:ns="http://www.bbbb"
 s:encodingStyle="http://schemas.xmlsoap.org/soap/encoding">

 < s:Header >
  < n: REQUEST >
   < REQUEST ID > 10 0 0 0 0 0 0 < / REQUEST ID >
   < /DESTINATION >
    < IMAGE FORMING APPARATUS ID > NONE < / IMAGE FORMING APPARATUS ID >
   < / SENDER >
  < /n: REQUEST >
 < /s:Header >

 < s:Body >
     Accompanying DATA
 < /s:Body >
< /s:Envelope >
```

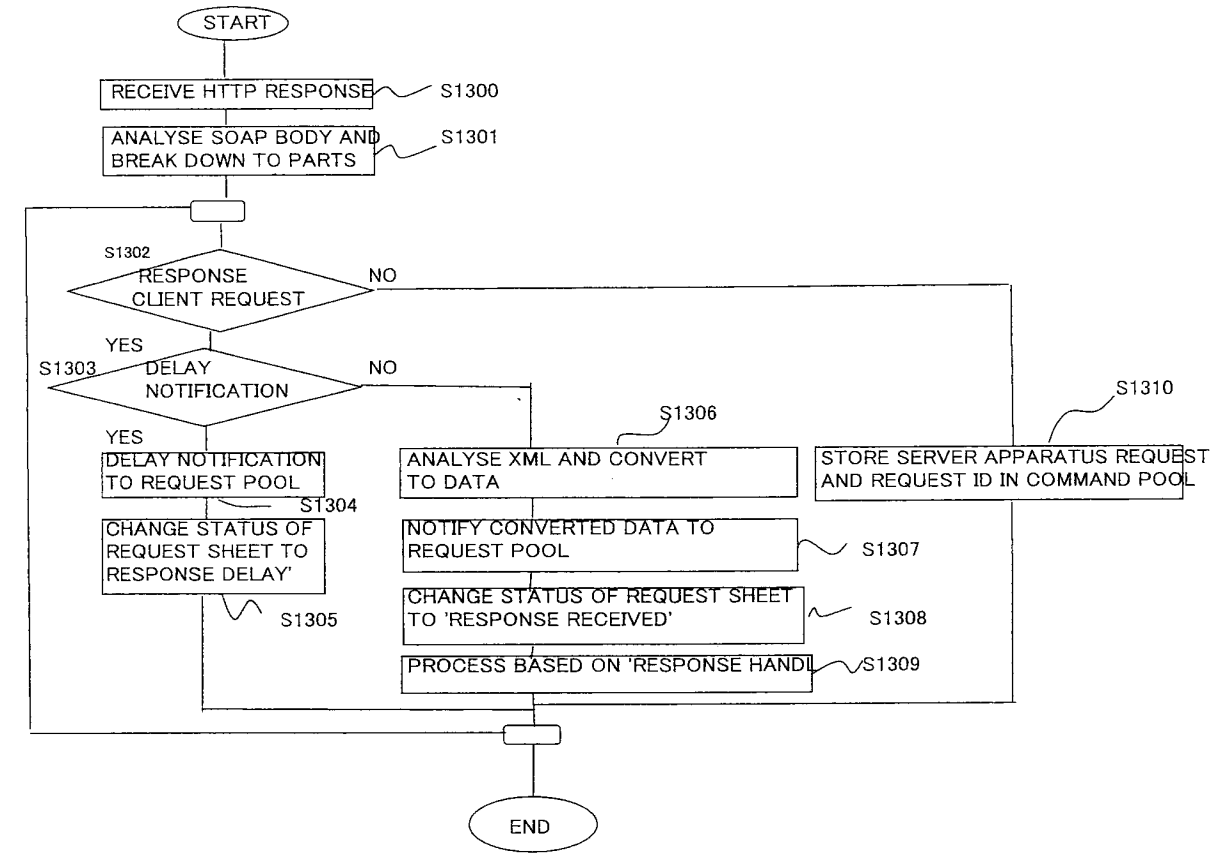
[Fig. 11]

```
Content-Type:text/xml;charset=UTF-8
Content-Transfer-Encoding:8bit

< s:Envelope
 xmlns:s="http://schemas.xmlsoap.org/soap/envelope/"
 xmlns:se="http://schemas.xmlsoap.org/soap/encoding/"
 xmlns:n="http://www.aaaa"
 xmlns:ns="http://www.bbbb"
 s:encodingStyle="http://schemas.xmlsoap.org/soap/encoding">

 < s:Header >
  < n: RESPONSE >
   < REQUEST ID > 10 0 0 0 0 0 0 < / REQUEST ID >
   < /SENDER >
    < IMAGE FORMING APPARATUS ID > NONE < / IMAGE FORMING APPARATUS ID >
   < / SENDER >
   < STATUS > OK < /STATUS >
  < /n: RESPONSE >
 < /s:Header >

 < s:Body >
     Accompanying DATA
 < /s:Body >
< /s:Envelope >
```

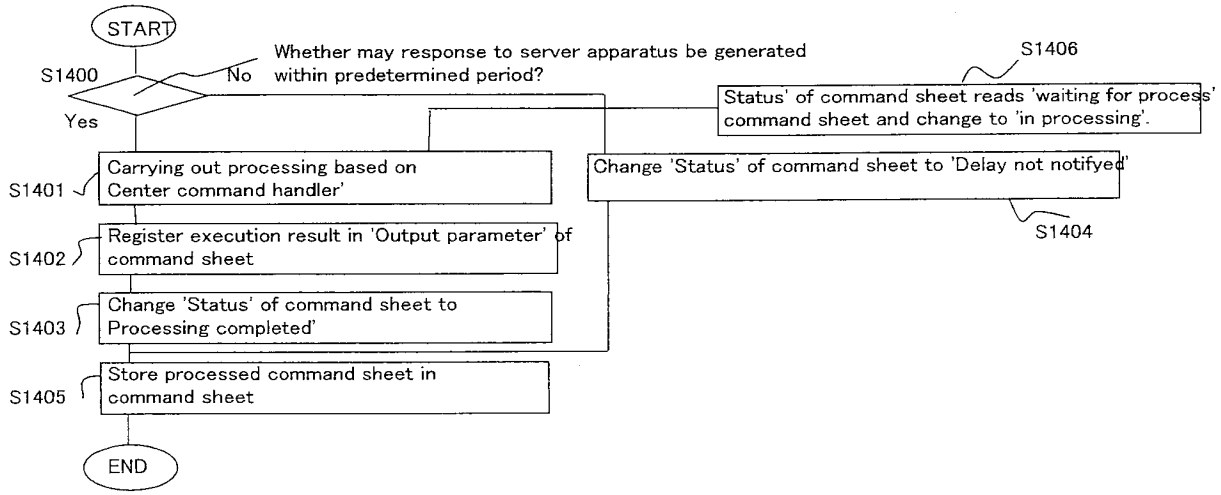
[Fig. 12]


START
TRANSMIT HTTP REQUEST
S1200
RECEIVE HTTP RESP
S1201
DIVIDE INTO PARTS
S1202
S1203
SERVER APPARATUS REQUEST?
YES
NO
SERVER APPARATUS REQUEST REGISTRATION PROCESSING
S1204
RESPONSE NOTIFICATION PROCESSING
S1205
REPEAT FOR EACH PART
REQUEST COLLECTION PROCESSING
S1206
RESPONSE COLLECTION PROCESSING
S1207
MERGE PARTS INTO ONE
S1208
TRANSMIT HTTP REQUEST
S1209
END

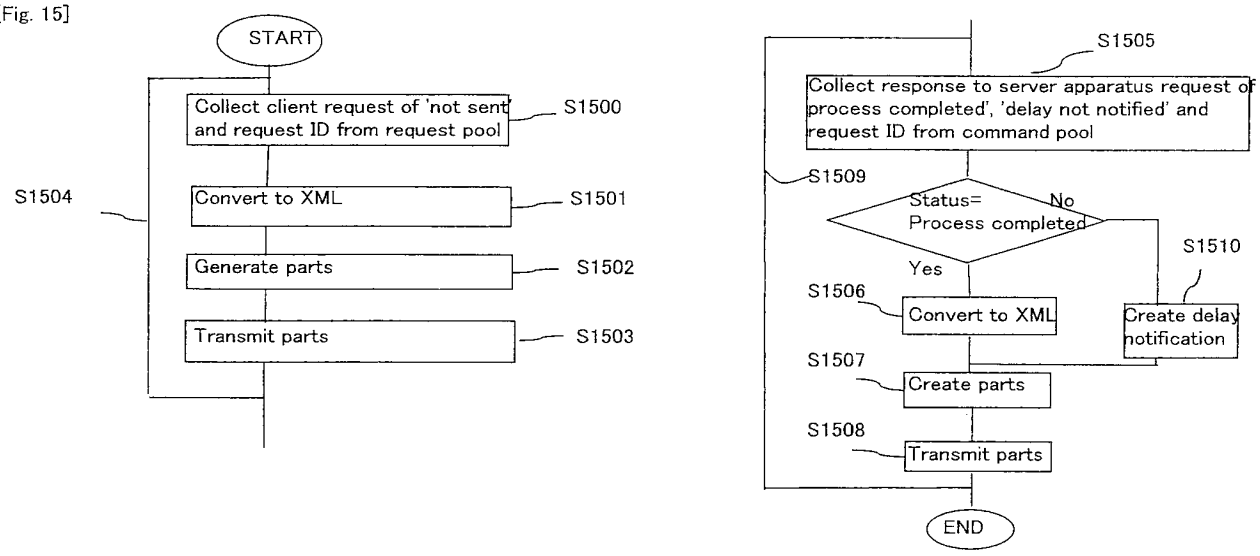
[Fig. 13]


START
RECEIVE HTTP RESPONSE
S1300
ANALYSE SOAP BODY AND BREAK DOWN TO PARTS
S1301
S1302
RESPONSE CLIENT REQUEST
NO
YES
S1303
DELAY NOTIFICATION
NO
YES
DELAY NOTIFICATION TO REQUEST POOL
S1304
CHANGE STATUS OF REQUEST SHEET TO RESPONSE DELAY'
S1305
S1306
ANALYSE XML AND CONVERT TO DATA
NOTIFY CONVERTED DATA TO REQUEST POOL
S1307
CHANGE STATUS OF REQUEST SHEET TO 'RESPONSE RECEIVED'
S1308
PROCESS BASED ON 'RESPONSE HANDL
S1309
S1310
STORE SERVER APPARATUS REQUEST AND REQUEST ID IN COMMAND POOL
END

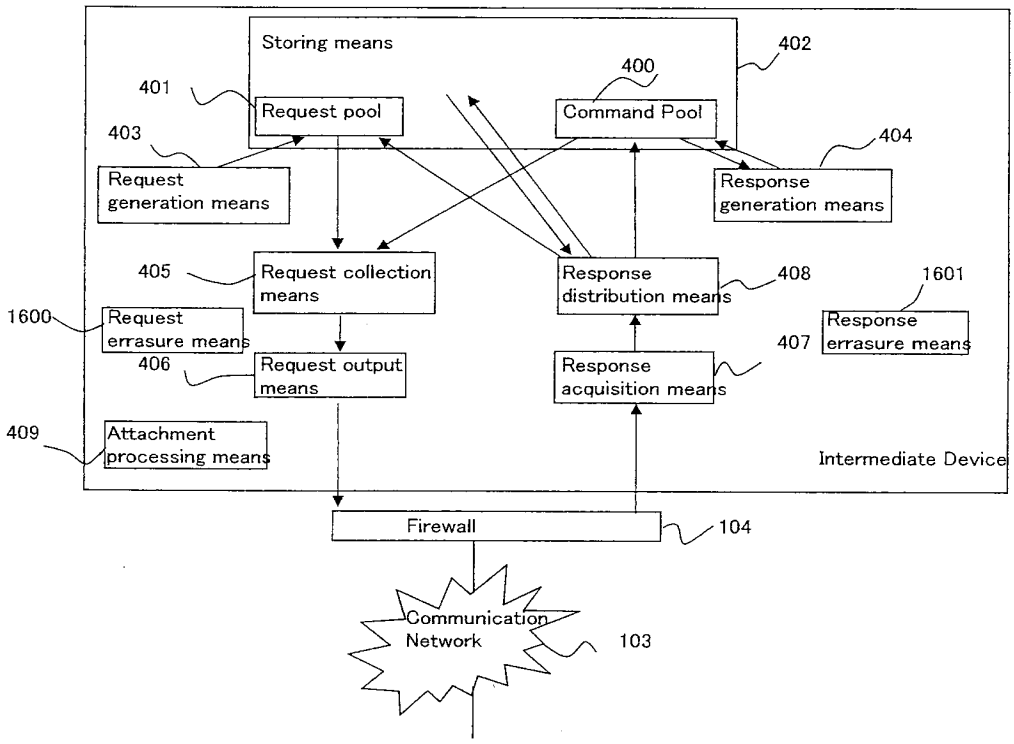
[Fig. 14]


START
S1400
Whether may response to server apparatus be generated within predetermined period?
No
Yes
S1406
Status' of command sheet reads 'waiting for process' command sheet and change to 'in processing'.
S1401
Carrying out processing based on Center command handler'
Change 'Status' of command sheet to 'Delay not notifyed'
S1404
S1402
Register execution result in 'Output parameter' of command sheet
S1403
Change 'Status' of command sheet to Processing completed'
S1405
Store processed command sheet in command sheet
END

[Fig. 15]


START
Collect client request of 'not sent' and request ID from request pool
S1500
Convert to XML
S1501
S1504
Generate parts
S1502
Transmit parts
S1503
S1505
Collect response to server apparatus request of process completed', 'delay not notified' and request ID from command pool
S1509
Status= Process completed
No
Yes
S1510
S1506
Convert to XML
Create delay notification
S1507
Create parts
S1508
Transmit parts
END

[Fig. 16]


Storing means
402
400
401
Request pool
Command Pool
403
404
Request generation means
Response generation means
405
Request collection means
Response distribution means
408
1601
1600
Request errasure means
Response errasure means
407
406
Request output means
Response acquisition means
409
Attachment processing means
Intermediate Device
Firewall
104
Communication Network
103